

SEQUENCE LISTING

<110> Lei, Xingen
Mullaney, Edward J
Ullah, Abul H.J.

<120> USING MUTATIONS TO IMPROVE ASPERGILLUS PHYTASES

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<150> 60/410,736

<151> 2002-09-13

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<170> PatentIn Ver. 2.1

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<211> 2665

<212> DNA

<213> Aspergillus niger

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<210> 2

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<212> PRT

<213> *Aspergillus niger*

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Thr Val Asp Gln Gly Tyr Gln Cys Phe Ser Glu Thr Ser His Leu Trp
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Gly Gln Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
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Arg His Gly Ala Arg Tyr Pro Thr Asp Ser Lys Gly Lys Lys Tyr Ser
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Ser	Gly	Ser	Ser	Arg	Val	Ile	Ala	Ser	Gly	Lys	Lys	Phe	Ile	Glu	Gly	165	170	175
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Ser	Pro	Lys	Ile	Asp	Val	Val	Ile	Ser	Glu	Ala	Ser	Ser	Ser	Asn	Asn	195	200	205
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Glu	Trp	Ile	Asn	Tyr	Asp	Tyr	Leu	Gln	Ser	Leu	Lys	Lys	Tyr	Tyr	Gly	290	295	300
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Asn	Glu	Leu	Ile	Ala	Arg	Leu	Thr	His	Ser	Pro	Val	His	Asp	Asp	Thr	325	330	335
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 370 375 380

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Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
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<213> *Aspergillus fumigatus*

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Gln Tyr Ser Pro Phe Phe Ser Leu Glu Asp Glu Leu Ser Val Ser Ser
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Lys Leu Pro Lys Asp Cys Arg Ile Thr Leu Val Gln Val Leu Ser Arg
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His Gly Ala Arg Tyr Pro Thr Ser Ser Lys Ser Lys Lys Tyr Lys Lys
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Leu Val Thr Ala Ile Gln Ala Asn Ala Thr Asp Phe Lys Gly Lys Phe
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Ala Phe Leu Lys Thr Tyr Asn Tyr Thr Leu Gly Ala Asp Asp Leu Thr
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Gly Ser Asp Arg Val Ile Ala Ser Gly Glu Lys Phe Ile Glu Gly Phe

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Ala Ser Gln Leu Ser Pro Phe Cys Gln Leu Phe Thr His Asn Glu Trp		
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<212> DNA
<213> *Aspergillus niger*

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<210> 6

<211> 467

<212> PRT

<213> *Aspergillus niger*

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Thr Val Asp Gln Gly Tyr Gln Cys Phe Ser Glu Thr Ser His Leu Trp
      35             40             45

Gly Pro Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
      50             55             60

Pro Glu Val Pro Ala Gly Cys Arg Val Thr Phe Ala Gln Val Leu Ser
      65             70             75             80

Arg His Gly Ala Arg Tyr Pro Thr Asp Ser Lys Gly Lys Lys Tyr Ser
      85             90             95

Ala Leu Ile Glu Glu Ile Gln Gln Asn Ala Thr Thr Phe Asp Gly Lys
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Tyr Ala Phe Leu Lys Thr Tyr Asn Tyr Ser Leu Gly Ala Asp Asp Leu
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Ser Pro Lys Ile Asp Val Val Ile Ser Glu Ala Ser Ser Ser Asn Asn					
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Thr Leu Asp Pro Gly Thr Cys Thr Val Phe Glu Asp Ser Glu Leu Ala					
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Asp Thr Val Glu Ala Asn Phe Thr Ala Thr Phe Val Pro Ser Ile Arg					
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Gln Arg Leu Glu Asn Asp Leu Ser Gly Val Thr Leu Thr Asp Thr Glu					
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Val Thr Tyr Leu Met Asp Met Cys Ser Phe Asp Thr Ile Ser Thr Ser					
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Asn Glu Leu Ile Ala Arg Leu Thr His Ser Pro Val His Asp Asp Thr					
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Ser Ser Asn His Thr Leu Asp Ser Ser Pro Ala Thr Phe Pro Leu Asn					
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Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile					
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<210> 8

<211> 467

<212> PRT

<213> *Aspergillus niger*

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Thr Ser Gly Leu Ala Val Pro Ala Ser Arg Asn Gln Ser Ser Cys Asp
          20                      25                      30

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Thr Val Asp Gln Gly Tyr Gln Cys Phe Ser Glu Thr Ser His Leu Trp
          35                      40                      45

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Gly Gln Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
          50                      55                      60

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Pro Glu Val Pro Ala Gly Cys Arg Val Thr Phe Ala Gln Val Leu Ser
          65                      70                      75                      80

```

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Arg His Gly Ala Arg Tyr Pro Thr Asp Ser Lys Gly Lys Lys Tyr Ser
          85                      90                      95

```

```

Ala Leu Ile Glu Glu Ile Gln Gln Asn Ala Thr Thr Phe Asp Gly Lys

```

100	105	110
Tyr Ala Phe Leu Lys Thr Tyr Asn Tyr Ser Leu Gly Ala Asp Asp Leu		
115	120	125
Thr Pro Phe Gly Glu Gln Glu Leu Val Asn Ser Gly Ile Lys Phe Tyr		
130	135	140
Gln Arg Tyr Glu Ser Leu Thr Arg Asn Ile Val Pro Phe Ile Arg Ser		
145	150	155
Ser Gly Ser Ser Arg Val Ile Ala Ser Gly Lys Lys Phe Ile Glu Gly		
	165	170
Phe Gln Ser Thr Lys Leu Lys Asp Pro Arg Ala Gln Pro Gly Gln Ser		
	180	185
Ser Pro Lys Ile Asp Val Val Ile Ser Glu Ala Ser Ser Ser Asn Asn		
	195	200
Thr Leu Asp Pro Gly Thr Cys Thr Val Phe Glu Asp Ser Glu Leu Ala		
	210	215
Asp Thr Val Glu Ala Asn Phe Thr Ala Thr Phe Val Pro Ser Ile Arg		
	225	230
Gln Arg Leu Glu Asn Asp Leu Ser Gly Val Thr Leu Thr Asp Thr Glu		
	245	250
Val Thr Tyr Leu Met Asp Met Cys Ser Phe Asp Thr Ile Ser Thr Ser		
	260	265
Thr Val Asp Thr Lys Leu Ser Pro Phe Cys Asp Leu Phe Thr His Asp		
	275	280
Glu Trp Ile Asn Tyr Asp Tyr Leu Gln Ser Leu Glu Lys Tyr Tyr Gly		
	290	295
His Gly Ala Gly Asn Pro Leu Gly Pro Thr Gln Gly Val Gly Tyr Ala		
	305	310
Asn Glu Leu Ile Ala Arg Leu Thr His Ser Pro Val His Asp Asp Thr		
	325	330
Ser Ser Asn His Thr Leu Asp Ser Ser Pro Ala Thr Phe Pro Leu Asn		
	340	345
Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile		

355 360 365
 Leu Phe Ala Leu Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Thr Thr
 370 375 380
 Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr
 385 390 395 400
 Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala
 405 410 415
 Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
 420 425 430
 Leu His Gly Cys Pro Val Asp Ala Leu Gly Arg Cys Thr Arg Asp Ser
 435 440 445
 Phe Val Arg Gly Leu Ser Phe Ala Arg Ser Gly Gly Asp Trp Ala Glu
 450 455 460
 Cys Phe Ala
 465

<210> 9

<211> 1455

<212> DNA

<213> *Aspergillus fumigatus*

<400> 9

atggtgactc tgactttcct gctttcggcg gcgtatctgc tttctgggtg agtggcttgg 60
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 cctagttctg ctggtccaa gtcctgcgat acggtagacc tcgggtacca gtgctccct 180
 gcgacttctc atctatgggg ccagtactcg ccattctttt cgctcgagga cgagctgtcc 240
 gtgtcgagta agcttcccaa ggattgcgag atcaccttgg tacaggtgct atcgcgccat 300
 ggagcgcggt acccaaccag ctccaagagc aaaaagtata agaagcttgt gacggcgatc 360
 caggccaatg ccaccgactt caagggcaag ttgacctttt tgaagacgta caactatact 420
 ctgggtgcgg atgacctcac tccctttggg gagcagcagc tgggtgaactc gggcatcaag 480
 ttctaccaga ggtacaaggc tctggcgcgc agtgtggtgc cgtttattcg cgcctcaggc 540
 tcggaccggg ttattgcttc gggagagaag ttcacgagg ggttcagca ggcgaagctg 600
 gctgatcctg gcgcgacgaa ccgcgcgct ccggcgatta gtgtgattat tccggagagc 660
 gagacgttca acaatacgtt ggaccaacgg gtgtgcacga agtttgaggc gagtcagctg 720
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 ctcttcactc acaatgagtg gaagaagtac aactaccttc agtccttggg caagtactac 960
 ggctacggcg caggcaaccc tctgggaccg gctcagggga tagggttcac caacgagctg 1020
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tccaacccgg ccaccttccc gttgaacgct accatgtacg tcgacttttc acacgacaac 1140
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gctttgatta atgaccgggt tgtgccactg catggctgcg atgtggacaa gctggggcga 1380
tgcaagctga atgactttgt caagggattg agttgggcca gatctggggg caactgggga 1440
gagtgcctta gttga 1455

<210> 10

<211> 465

<212> PRT

<213> *Aspergillus fumigatus*

<400> 10

Met Val Thr Leu Thr Phe Leu Leu Ser Ala Ala Tyr Leu Leu Ser Gly
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Arg Val Ser Ala Ala Pro Ser Ser Ala Gly Ser Lys Ser Cys Asp Thr
20 25 30

Val Asp Leu Gly Tyr Gln Cys Ser Pro Ala Thr Ser His Leu Trp Gly
35 40 45

Gln Tyr Ser Pro Phe Phe Ser Leu Glu Asp Glu Leu Ser Val Ser Ser
50 55 60

Lys Leu Pro Lys Asp Cys Arg Ile Thr Leu Val Gln Val Leu Ser Arg
65 70 75 80

His Gly Ala Arg Tyr Pro Thr Ser Ser Lys Ser Lys Lys Tyr Lys Lys
85 90 95

Leu Val Thr Ala Ile Gln Ala Asn Ala Thr Asp Phe Lys Gly Lys Phe
100 105 110

Ala Phe Leu Lys Thr Tyr Asn Tyr Thr Leu Gly Ala Asp Asp Leu Thr
115 120 125

Pro Phe Gly Glu Gln Gln Leu Val Asn Ser Gly Ile Lys Phe Tyr Gln
130 135 140

Arg Tyr Lys Ala Leu Ala Arg Ser Val Val Pro Phe Ile Arg Ala Ser
145 150 155 160

Gly Ser Asp Arg Val Ile Ala Ser Gly Glu Lys Phe Ile Glu Gly Phe
165 170 175

Gln Gln Ala Lys Leu Ala Asp Pro Gly Ala Thr Asn Arg Ala Ala Pro
 180 185 190

Ala Ile Ser Val Ile Ile Pro Glu Ser Glu Thr Phe Asn Asn Thr Leu
 195 200 205

Asp His Gly Val Cys Thr Lys Phe Glu Ala Ser Gln Leu Gly Asp Glu
 210 215 220

Val Ala Ala Asn Phe Thr Ala Leu Phe Ala Pro Asp Ile Arg Ala Arg
 225 230 235 240

Ala Glu Lys His Leu Pro Gly Val Thr Leu Thr Asp Glu Asp Val Val
 245 250 255

Ser Leu Met Asp Met Cys Ser Phe Asp Thr Val Ala Arg Thr Ser Asp
 260 265 270

Ala Ser Gln Leu Ser Pro Phe Cys Gln Leu Phe Thr His Asn Glu Trp
 275 280 285

Lys Lys Tyr Asn Tyr Leu Gln Ser Leu Gly Lys Tyr Tyr Gly Tyr Gly
 290 295 300

Ala Gly Asn Pro Leu Gly Pro Ala Gln Gly Ile Gly Phe Thr Asn Glu
 305 310 315 320

Leu Ile Ala Arg Leu Thr Arg Ser Pro Val Gln Asp His Thr Ser Thr
 325 330 335

Asn Ser Thr Leu Val Ser Asn Pro Ala Thr Phe Pro Leu Asn Ala Thr
 340 345 350

Met Tyr Val Asp Phe Ser His Asp Asn Ser Leu Val Ser Ile Phe Phe
 355 360 365

Ala Leu Gly Leu Tyr Asn Gly Thr Glu Pro Leu Ser Arg Thr Ser Val
 370 375 380

Glu Ser Ala Lys Glu Leu Asp Gly Tyr Ser Ala Ser Trp Val Val Pro
 385 390 395 400

Phe Gly Ala Arg Ala Tyr Phe Glu Thr Met Gln Cys Lys Ser Glu Lys
 405 410 415

Glu Pro Leu Val Arg Ala Leu Ile Asn Asp Arg Val Val Pro Leu His
 420 425 430

Gly Cys Asp Val Asp Lys Leu Gly Arg Cys Lys Leu Asn Asp Phe Val
 435 440 445

Lys Gly Leu Ser Trp Ala Arg Ser Gly Gly Asn Trp Gly Glu Cys Phe
 450 455 460

Ser
 465

<210> 11
 <211> 2665
 <212> DNA
 <213> *Aspergillus niger*

<400> 11
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 gttctgttct tatgatttcc ccacgtcctt tcgggctttc ggcacagcaa aatagattgt 180
 ttagcaggta cagaaacaac ttgatgacac atgcatccga gaatcttcag ccgtggaagc 240
 attcatgtag atctttgcta agagaaatga tggcggccca gggcatccag gcaccttttc 300
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 gcctttctct cgagaaaagct cctccacttc tcccactaga tatctccgtc cccgtcgcact 480
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 ttgcgatgac aacggcatca tctccattct ctttgcttta ggtctgtaca acggcactaa 1920

```

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gccgctggtc cgtgtcttgg ttaatgatcg cgttgtcccg ctgcatgggt gtccggttga 2100
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acactcctcc ccaacgcaat accaaccgca attcatcata cctcatataa atacaatata 2460
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tacttctccc cctccccctc acccttccca gaactcacc ccgaagtagt aatagtagta 2580
gtagaagaag cagacgacct ctccaccaat ctcttcggcc tcttatcccc atacgctaca 2640
caaaaccccc accccgttag catgc 2665

```

<210> 12

<211> 467

<212> PRT

<213> *Aspergillus niger*

<400> 12

```

Met Gly Val Ser Ala Val Leu Leu Pro Leu Tyr Leu Leu Ser Gly Val
  1                      5                      10                     15

```

```

Thr Ser Gly Leu Ala Val Pro Ala Ser Arg Asn Gln Ser Ser Cys Asp
          20                      25                     30

```

```

Thr Val Asp Gln Gly Tyr Gln Cys Phe Ser Glu Thr Ser His Leu Trp
          35                      40                     45

```

```

Gly Leu Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
          50                      55                     60

```

```

Pro Glu Val Pro Ala Gly Cys Arg Val Thr Phe Ala Gln Val Leu Ser
          65                      70                     75                     80

```

```

Arg His Gly Ala Arg Tyr Pro Thr Asp Ser Lys Gly Lys Lys Tyr Ser
          85                      90                     95

```

```

Ala Leu Ile Glu Glu Ile Gln Gln Asn Ala Thr Thr Phe Asp Gly Lys
          100                     105                    110

```

```

Tyr Ala Phe Leu Lys Thr Tyr Asn Tyr Ser Leu Gly Ala Asp Asp Leu
          115                     120                    125

```

```

Thr Pro Phe Gly Glu Gln Glu Leu Val Asn Ser Gly Ile Lys Phe Tyr
          130                     135                    140

```

Gln Arg Tyr Glu Ser Leu Thr Arg Asn Ile Val Pro Phe Ile Arg Ser			
145	150	155	160
Ser Gly Ser Ser Arg Val Ile Ala Ser Gly Lys Lys Phe Ile Glu Gly			
	165	170	175
Phe Gln Ser Thr Lys Leu Lys Asp Pro Arg Ala Gln Pro Gly Gln Ser			
	180	185	190
Ser Pro Lys Ile Asp Val Val Ile Ser Glu Ala Ser Ser Ser Asn Asn			
	195	200	205
Thr Leu Asp Pro Gly Thr Cys Thr Val Phe Glu Asp Ser Glu Leu Ala			
	210	215	220
Asp Thr Val Glu Ala Asn Phe Thr Ala Thr Phe Val Pro Ser Ile Arg			
225	230	235	240
Gln Arg Leu Glu Asn Asp Leu Ser Gly Val Thr Leu Thr Asp Thr Glu			
	245	250	255
Val Thr Tyr Leu Met Asp Met Cys Ser Phe Asp Thr Ile Ser Thr Ser			
	260	265	270
Thr Val Asp Thr Lys Leu Ser Pro Phe Cys Asp Leu Phe Thr His Asp			
	275	280	285
Glu Trp Ile Asn Tyr Asp Tyr Leu Gln Ser Leu Lys Lys Tyr Tyr Gly			
	290	295	300
His Gly Ala Gly Asn Pro Leu Gly Pro Thr Gln Gly Val Gly Tyr Ala			
305	310	315	320
Asn Glu Leu Ile Ala Arg Leu Thr His Ser Pro Val His Asp Asp Thr			
	325	330	335
Ser Ser Asn His Thr Leu Asp Ser Ser Pro Ala Thr Phe Pro Leu Asn			
	340	345	350
Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile			
	355	360	365
Leu Phe Ala Leu Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Thr Thr			
	370	375	380
Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr			
385	390	395	400

Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala
 405 410 415

Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
 420 425 430

Leu His Gly Cys Pro Val Asp Ala Leu Gly Arg Cys Thr Arg Asp Ser
 435 440 445

Phe Val Arg Gly Leu Ser Phe Ala Arg Ser Gly Gly Asp Trp Ala Glu
 450 455 460

Cys Phe Ala
 465

<210> 13
 <211> 1401
 <212> DNA
 <213> *Aspergillus terreus*

<400> 13
 atggggggttt tcgtcgttct attatctatc ggcactctgt tcggcagcac atcgggcact 60
 gcgctgggcc cccgtggaaa tcacagcgac tgcacctcag tcgaccgggg gtatcaatgc 120
 ttccctgagc tctcccataa atgggggtctc tacgcgcctt atttctccct ccaggatgaa 180
 tctccgtttc ctctggacgt cccggatgac tgccacatca cctttgtgca ggtgctggcc 240
 cgacatggag cgcggtctcc aaccgatagc aagacaaagg cgtatgccgc gactattgca 300
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 gccagttct accgtcgcta cgacaccctc acccggcaca tcaacccttt cgtccgggcc 480
 gcggattcct cccgcgtcca cgaatcagcc gagaagtctg tcgagggtt ccaaaacgcc 540
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 cccgaaggca ccgcctacaa caacacgctc gagcacagca tctgcaccgc cttcgaggcc 660
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 aagcgtctgg aggcgatct gcccggcgtg cagctgtccg ccgacgacgt ggtcaatctg 780
 atggccatgt gtccgttcga gacggtcagc ctgaccgacg acgcgcacac gctgtcgccg 840
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 gtgccgtttg ccgccgcgc ctacatcgag atgatgcagt gtgcgcgga gaagcagccg 1260
 ctggtgcgcg tgctggtcaa cgaccgtgtc atgccgtgc acggctgcgc ggtggataat 1320
 ctgggcaggt gtaaacggga cgactttgtg gagggactga gctttgcgcg ggcaggaggg 1380
 aactgggccg agtggtttctg a 1401

<210> 14

<211> 466

<212> PRT

<213> *Aspergillus terreus*

<400> 14

Met Gly Val Phe Val Val Leu Leu Ser Ile Ala Thr Leu Phe Gly Ser
1 5 10 15

Thr Ser Gly Thr Ala Leu Gly Pro Arg Gly Asn His Ser Asp Cys Thr
20 25 30

Ser Val Asp Arg Gly Tyr Gln Cys Phe Pro Glu Leu Ser His Lys Trp
35 40 45

Gly Leu Tyr Ala Pro Tyr Phe Ser Leu Gln Asp Glu Ser Pro Phe Pro
50 55 60

Leu Asp Val Pro Asp Asp Cys His Ile Thr Phe Val Gln Val Leu Ala
65 70 75 80

Arg His Gly Ala Arg Ser Pro Thr Asp Ser Lys Thr Lys Ala Tyr Ala
85 90 95

Ala Thr Ile Ala Ala Ile Gln Lys Asn Ala Thr Ala Leu Pro Gly Lys
100 105 110

Tyr Ala Phe Leu Lys Ser Tyr Asn Tyr Ser Met Gly Ser Glu Asn Leu
115 120 125

Asn Pro Phe Gly Arg Asn Gln Leu Gln Asp Leu Gly Ala Gln Phe Tyr
130 135 140

Arg Arg Tyr Asp Thr Leu Thr Arg His Ile Asn Pro Phe Val Arg Ala
145 150 155 160

Ala Asp Ser Ser Arg Val His Glu Ser Ala Glu Lys Phe Val Glu Gly
165 170 175

Phe Gln Asn Ala Arg Gln Gly Asp Pro His Ala Asn Pro His Gln Pro
180 185 190

Ser Pro Arg Val Asp Val Val Ile Pro Glu Gly Thr Ala Tyr Asn Asn
195 200 205

Thr Leu Glu His Ser Ile Cys Thr Ala Phe Glu Ala Ser Thr Val Gly
210 215 220

Asp Ala Ala Ala Asp Asn Phe Thr Ala Val Phe Ala Pro Ala Ile Ala
 225 230 235 240

Lys Arg Leu Glu Ala Asp Leu Pro Gly Val Gln Leu Ser Ala Asp Asp
 245 250 255

Val Val Asn Leu Met Ala Met Cys Pro Phe Glu Thr Val Ser Leu Thr
 260 265 270

Asp Asp Ala His Thr Leu Ser Pro Phe Cys Asp Leu Phe Thr Ala Ala
 275 280 285

Glu Trp Thr Gln Tyr Asn Tyr Leu Leu Ser Leu Asp Lys Tyr Tyr Gly
 290 295 300

Tyr Gly Gly Gly Asn Pro Leu Gly Pro Val Gln Gly Val Gly Trp Ala
 305 310 315 320

Asn Glu Leu Ile Ala Arg Leu Thr Arg Ser Pro Val His Asp His Thr
 325 330 335

Cys Val Asn Asn Thr Leu Asp Ala Asn Pro Ala Thr Phe Pro Leu Asn
 340 345 350

Ala Thr Leu Tyr Ala Asp Phe Ser His Asp Ser Asn Leu Val Ser Ile
 355 360 365

Phe Trp Ala Leu Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Gln Thr
 370 375 380

Thr Val Glu Asp Ile Thr Arg Thr Asp Gly Tyr Ala Ala Ala Trp Thr
 385 390 395 400

Val Pro Phe Ala Ala Arg Ala Tyr Ile Glu Met Met Gln Cys Arg Ala
 405 410 415

Glu Lys Gln Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Met Pro
 420 425 430

Leu His Gly Cys Ala Val Asp Asn Leu Gly Arg Cys Lys Arg Asp Asp
 435 440 445

Phe Val Glu Gly Leu Ser Phe Ala Arg Ala Gly Gly Asn Trp Ala Glu
 450 455 460

Cys Phe
 465

<210> 15
 <211> 2665
 <212> DNA
 <213> *Aspergillus niger*

<400> 15
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 ggctatagac actgccgtta tctgactttt aatgagcgag ggcgatgttc atcattcggc 120
 gttctgttct tatgatttcc ccacgtcctt tcgggctttc ggcacagcaa aatagattgt 180
 ttagcaggta cagaaacaac ttgatgacac atgcatccga gaatcttcag ccgtggaagc 240
 attcatgtag atctttgcta agagaaatga tggcggccca gggcatccag gcaccttttc 300
 caacggggaa cttccgccgt ccacgtgctc tgattcagcc aatcaagacg tcccacggca 360
 atgctggatc aacgatcaac ttgaatgcaa taaatgaaga tggaactaac accatctgct 420
 gcctttctct cgagaaagct cctccacttc tcccactaga tatctccgtc cccgtcgact 480
 tcccgtccta ttcggcctcg tccgtgaag atccatccca ccattgcacg tgggccacct 540
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 gaaattactt ctcataggca tcatgggctg ctctgctgtt ctacttcctt tgtatctcct 720
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 caactacagc ttgggtgcag atgacctgac tcccttcgga gaacaggagc tagtcaactc 1200
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<210> 16

<211> 467

<212> PRT

<213> *Aspergillus niger*

<400> 16

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 35 40 45

Gly Gln Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
 50 55 60

Pro Glu Val Pro Ala Gly Cys Arg Val Thr Phe Ala Gln Val Leu Ser
 65 70 75 80

Arg His Gly Ala Arg Tyr Pro Thr Asp Ser Ala Gly Lys Lys Tyr Ser
 85 90 95

Ala Leu Ile Glu Glu Ile Gln Gln Asn Ala Thr Thr Phe Asp Gly Lys
 100 105 110

Tyr Ala Phe Leu Lys Thr Tyr Asn Tyr Ser Leu Gly Ala Asp Asp Leu
 115 120 125

Thr Pro Phe Gly Glu Gln Glu Leu Val Asn Ser Gly Ile Lys Phe Tyr
 130 135 140

Gln Arg Tyr Glu Ser Leu Thr Arg Asn Ile Val Pro Phe Ile Arg Ser
 145 150 155 160

Ser Gly Ser Ser Arg Val Ile Ala Ser Gly Lys Lys Phe Ile Glu Gly
 165 170 175

Phe Gln Ser Thr Lys Leu Lys Asp Pro Arg Ala Gln Pro Gly Gln Ser
 180 185 190

Ser Pro Lys Ile Asp Val Val Ile Ser Glu Ala Ser Ser Ser Asn Asn
 195 200 205

Thr Leu Asp Pro Gly Thr Cys Thr Val Phe Glu Asp Ser Glu Leu Ala
 210 215 220

Asp Thr Val Glu Ala Asn Phe Thr Ala Thr Phe Val Pro Ser Ile Arg
 225 230 235 240

Gln Arg Leu Glu Asn Asp Leu Ser Gly Val Thr Leu Thr Asp Thr Glu
 245 250 255

Val Thr Tyr Leu Met Asp Met Cys Ser Phe Asp Thr Ile Ser Thr Ser
 260 265 270

Thr Val Asp Thr Lys Leu Ser Pro Phe Cys Asp Leu Phe Thr His Asp
 275 280 285

Glu Trp Ile Asn Tyr Asp Tyr Leu Gln Ser Leu Lys Lys Tyr Tyr Gly
 290 295 300

His Gly Ala Gly Asn Pro Leu Gly Pro Thr Gln Gly Val Gly Tyr Ala
 305 310 315 320

Asn Glu Leu Ile Ala Arg Leu Thr His Ser Pro Val His Asp Asp Thr
 325 330 335

Ser Ser Asn His Thr Leu Asp Ser Ser Pro Ala Thr Phe Pro Leu Asn
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Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile
 355 360 365

Leu Phe Ala Leu Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Thr Thr
 370 375 380

Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr
 385 390 395 400

Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala
 405 410 415

Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
 420 425 430

Leu His Gly Cys Pro Val Asp Ala Leu Gly Arg Cys Thr Arg Asp Ser
 435 440 445

Phe Val Arg Gly Leu Ser Phe Ala Arg Ser Gly Gly Asp Trp Ala Glu
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Cys Phe Ala
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<210> 17
 <211> 2665
 <212> DNA
 <213> *Aspergillus niger*

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<211> 467

<212> PRT

<213> *Aspergillus niger*

<400> 18

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Thr Val Asp Gln Gly Tyr Gln Cys Phe Ser Glu Thr Ser His Leu Trp
 35 40 45

Gly Gln Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
 50 55 60

Pro Glu Val Pro Ala Gly Cys Arg Val Thr Phe Ala Gln Val Leu Ser
 65 70 75 80

Arg His Gly Ala Arg Tyr Pro Thr Asp Ser Glu Gly Lys Lys Tyr Ser
 85 90 95

Ala Leu Ile Glu Glu Ile Gln Gln Asn Ala Thr Thr Phe Asp Gly Lys
 100 105 110

Tyr Ala Phe Leu Lys Thr Tyr Asn Tyr Ser Leu Gly Ala Asp Asp Leu
 115 120 125

Thr Pro Phe Gly Glu Gln Glu Leu Val Asn Ser Gly Ile Lys Phe Tyr
 130 135 140

Gln Arg Tyr Glu Ser Leu Thr Arg Asn Ile Val Pro Phe Ile Arg Ser
 145 150 155 160

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Phe Gln Ser Thr Lys Leu Lys Asp Pro Arg Ala Gln Pro Gly Gln Ser		
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Ser Pro Lys Ile Asp Val Val Ile Ser Glu Ala Ser Ser Ser Asn Asn		
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Thr Leu Asp Pro Gly Thr Cys Thr Val Phe Glu Asp Ser Glu Leu Ala		
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Asp Thr Val Glu Ala Asn Phe Thr Ala Thr Phe Val Pro Ser Ile Arg		
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Gln Arg Leu Glu Asn Asp Leu Ser Gly Val Thr Leu Thr Asp Thr Glu		
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Val Thr Tyr Leu Met Asp Met Cys Ser Phe Asp Thr Ile Ser Thr Ser		
	260	265 270
Thr Val Asp Thr Lys Leu Ser Pro Phe Cys Asp Leu Phe Thr His Asp		
	275	280 285
Glu Trp Ile Asn Tyr Asp Tyr Leu Gln Ser Leu Lys Lys Tyr Tyr Gly		
	290	295 300
His Gly Ala Gly Asn Pro Leu Gly Pro Thr Gln Gly Val Gly Tyr Ala		
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Asn Glu Leu Ile Ala Arg Leu Thr His Ser Pro Val His Asp Asp Thr		
	325	330 335
Ser Ser Asn His Thr Leu Asp Ser Ser Pro Ala Thr Phe Pro Leu Asn		
	340	345 350
Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile		
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Leu Phe Ala Leu Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Thr Thr		
	370	375 380
Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr		
	385	390 395 400
Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala		
	405	410 415

Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
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Leu His Gly Cys Pro Val Asp Ala Leu Gly Arg Cys Thr Arg Asp Ser
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Phe Val Arg Gly Leu Ser Phe Ala Arg Ser Gly Gly Asp Trp Ala Glu
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Cys Phe Ala
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<210> 19

<211> 2665

<212> DNA

<213> *Aspergillus niger*

<400> 19

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<210> 20

<211> 467

<212> PRT

<213> *Aspergillus niger*

<400> 20

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Thr Val Asp Gln Gly Tyr Gln Cys Phe Ser Glu Thr Ser His Leu Trp
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Gly Gln Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
      50              55              60

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Pro Glu Val Pro Ala Gly Cys Arg Val Thr Phe Ala Gln Val Leu Ser
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Arg His Gly Ala Arg Tyr Pro Thr Asp Ser Lys Gly Lys Glu Tyr Ser
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Ala Leu Ile Glu Glu Ile Gln Gln Asn Ala Thr Thr Phe Asp Gly Lys
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Tyr Ala Phe Leu Lys Thr Tyr Asn Tyr Ser Leu Gly Ala Asp Asp Leu
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Ser	Pro	Lys	Ile	Asp	Val	Val	Ile	Ser	Glu	Ala	Ser	Ser	Ser	Asn	Asn	195	200	205	
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Ser	Thr	Leu	Tyr	Ala	Asp	Phe	Ser	His	Asp	Asn	Gly	Ile	Ile	Ser	Ile	355	360	365	
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Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr
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Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala
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Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
 420 425 430

Leu His Gly Cys Pro Val Asp Ala Leu Gly Arg Cys Thr Arg Asp Ser
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Phe Val Arg Gly Leu Ser Phe Ala Arg Ser Gly Gly Asp Trp Ala Glu
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Cys Phe Ala
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<210> 21
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 <212> DNA
 <213> *Aspergillus niger*

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<210> 22

<211> 467

<212> PRT

<213> *Aspergillus niger*

<400> 22

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35 40 45

Gly Gln Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
50 55 60

Pro Glu Val Pro Ala Gly Cys Arg Val Thr Phe Ala Gln Val Leu Ser
65 70 75 80

Arg His Gly Ala Arg Tyr Pro Thr Asp Ser Lys Gly Lys Lys Tyr Ser
85 90 95

Ala	Leu	Ile	Glu	Glu	Ile	Gln	Gln	Asn	Ala	Thr	Thr	Phe	Asp	Gly	Lys	100	105	110	
Tyr	Ala	Phe	Leu	Lys	Thr	Tyr	Asn	Tyr	Ser	Leu	Gly	Ala	Asp	Asp	Leu	115	120	125	
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Ser	Gly	Ser	Ser	Arg	Val	Ile	Ala	Ser	Gly	Lys	Lys	Phe	Ile	Glu	Gly	165	170	175	
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Ser	Pro	Lys	Ile	Asp	Val	Val	Ile	Ser	Glu	Ala	Ser	Ser	Ser	Asn	Asn	195	200	205	
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Asp	Thr	Val	Gln	Ala	Asn	Phe	Thr	Ala	Thr	Phe	Val	Pro	Ser	Ile	Arg	225	230	235	240
Gln	Arg	Leu	Glu	Asn	Asp	Leu	Ser	Gly	Val	Thr	Leu	Thr	Asp	Thr	Glu	245	250	255	
Val	Thr	Tyr	Leu	Met	Asp	Met	Cys	Ser	Phe	Asp	Thr	Ile	Ser	Thr	Ser	260	265	270	
Thr	Val	Asp	Thr	Lys	Leu	Ser	Pro	Phe	Cys	Asp	Leu	Phe	Thr	His	Asp	275	280	285	
Glu	Trp	Ile	Asn	Tyr	Asp	Tyr	Leu	Gln	Ser	Leu	Lys	Lys	Tyr	Tyr	Gly	290	295	300	
His	Gly	Ala	Gly	Asn	Pro	Leu	Gly	Pro	Thr	Gln	Gly	Val	Gly	Tyr	Ala	305	310	315	320
Asn	Glu	Leu	Ile	Ala	Arg	Leu	Thr	His	Ser	Pro	Val	His	Asp	Asp	Thr	325	330	335	
Ser	Ser	Asn	His	Thr	Leu	Asp	Ser	Ser	Pro	Ala	Thr	Phe	Pro	Leu	Asn	340	345	350	

Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile
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Leu Phe Ala Leu Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Thr Thr
 370 375 380

Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr
 385 390 395 400

Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala
 405 410 415

Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
 420 425 430

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<210> 23
 <211> 2665
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 <213> *Aspergillus niger*

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<210> 24

<211> 467

<212> PRT

<213> *Aspergillus niger*

<400> 24

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			20					25						30	

Thr	Val	Asp	Gln	Gly	Tyr	Gln	Cys	Phe	Ser	Glu	Thr	Ser	His	Leu	Trp
			35				40					45			

Gly	Gln	Tyr	Ala	Pro	Phe	Phe	Ser	Leu	Ala	Asn	Glu	Ser	Val	Ile	Ser
			50				55				60				

Pro	Glu	Val	Pro	Ala	Gly	Cys	Arg	Val	Thr	Phe	Ala	Gln	Val	Leu	Ser	65	70	75	80
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Gln	Arg	Leu	Glu	Asn	Asp	Leu	Ser	Gly	Val	Thr	Leu	Thr	Asp	Thr	Glu	245	250	255	
Val	Thr	Tyr	Leu	Met	Asp	Met	Cys	Ser	Phe	Asp	Thr	Ile	Ser	Thr	Ser	260	265	270	
Thr	Val	Asp	Thr	Lys	Leu	Ser	Pro	Phe	Cys	Asp	Leu	Phe	Thr	His	Asp	275	280	285	
Glu	Trp	Ile	Asn	Tyr	Asp	Tyr	Leu	Gln	Ser	Leu	Lys	Lys	Tyr	Tyr	Gly	290	295	300	
His	Gly	Ala	Gly	Asn	Pro	Leu	Gly	Pro	Thr	Gln	Gly	Val	Gly	Tyr	Ala	305	310	315	320

Asn Glu Leu Ile Ala Arg Leu Thr His Ser Pro Val His Asp Asp Thr
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Ser Ser Asn His Thr Leu Asp Ser Ser Pro Ala Thr Phe Pro Leu Asn
 340 345 350

Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile
 355 360 365

Leu Phe Ala Leu Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Thr Thr
 370 375 380

Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr
 385 390 395 400

Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala
 405 410 415

Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
 420 425 430

Leu His Gly Cys Pro Val Asp Ala Leu Gly Arg Cys Thr Arg Asp Ser
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Phe Val Arg Gly Leu Ser Phe Ala Arg Ser Gly Gly Asp Trp Ala Glu
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Cys Phe Ala
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<210> 25

<211> 2665

<212> DNA

<213> *Aspergillus niger*

<400> 25

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<211> 467

<212> PRT

<213> *Aspergillus niger*

<400> 26

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			20					25						30	

Thr	Val	Asp	Gln	Gly	Tyr	Gln	Cys	Phe	Ser	Glu	Thr	Ser	His	Leu	Trp	35	40	45
Gly	Gln	Tyr	Ala	Pro	Phe	Phe	Ser	Leu	Ala	Asn	Glu	Ser	Val	Ile	Ser	50	55	60
Pro	Glu	Val	Pro	Ala	Gly	Cys	Arg	Val	Thr	Phe	Ala	Gln	Val	Leu	Ser	65	70	75
Arg	His	Gly	Ala	Arg	Tyr	Pro	Thr	Asp	Ser	Lys	Gly	Lys	Lys	Tyr	Ser	85	90	95
Ala	Leu	Ile	Glu	Glu	Ile	Gln	Gln	Asn	Ala	Thr	Thr	Phe	Asp	Gly	Lys	100	105	110
Tyr	Ala	Phe	Leu	Lys	Thr	Tyr	Asn	Tyr	Ser	Leu	Gly	Ala	Asp	Asp	Leu	115	120	125
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Gln	Arg	Leu	Glu	Asn	Asp	Leu	Ser	Gly	Val	Thr	Leu	Thr	Asp	Thr	Glu	245	250	255
Val	Thr	Tyr	Leu	Met	His	Met	Cys	Ser	Phe	Asp	Thr	Ile	Ser	Thr	Ser	260	265	270
Thr	Val	Asp	Thr	Lys	Leu	Ser	Pro	Phe	Cys	Asp	Leu	Phe	Thr	His	Asp	275	280	285

Glu Trp Ile Asn Tyr Asp Tyr Leu Gln Ser Leu Lys Lys Tyr Tyr Gly
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His Gly Ala Gly Asn Pro Leu Gly Pro Thr Gln Gly Val Gly Tyr Ala
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Asn Glu Leu Ile Ala Arg Leu Thr His Ser Pro Val His Asp Asp Thr
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Ser Ser Asn His Thr Leu Asp Ser Ser Pro Ala Thr Phe Pro Leu Asn
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Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile
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Leu Phe Ala Leu Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Thr Thr
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Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr
 385 390 395 400

Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala
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Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
 420 425 430

Leu His Gly Cys Pro Val Asp Ala Leu Gly Arg Cys Thr Arg Asp Ser
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Phe Val Arg Gly Leu Ser Phe Ala Arg Ser Gly Gly Asp Trp Ala Glu
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Cys Phe Ala
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<210> 27

<211> 2665

<212> DNA

<213> *Aspergillus niger*

<400> 27

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<210> 28

<211> 467

<212> PRT

<213> *Aspergillus niger*

<400> 28

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 Thr Val Asp Gln Gly Tyr Gln Cys Phe Ser Glu Thr Ser His Leu Trp
 35 40 45
 Gly Gln Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
 50 55 60
 Pro Glu Val Pro Ala Gly Cys Arg Val Thr Phe Ala Gln Val Leu Ser
 65 70 75 80
 Arg His Gly Ala Arg Tyr Pro Thr Asp Ser Lys Gly Lys Lys Tyr Ser
 85 90 95
 Ala Leu Ile Glu Glu Ile Gln Gln Asn Ala Thr Thr Phe Asp Gly Lys
 100 105 110
 Tyr Ala Phe Leu Lys Thr Tyr Asn Tyr Ser Leu Gly Ala Asp Asp Leu
 115 120 125
 Thr Pro Phe Gly Glu Gln Glu Leu Val Asn Ser Gly Ile Lys Phe Tyr
 130 135 140
 Gln Arg Tyr Glu Ser Leu Thr Arg Asn Ile Val Pro Phe Ile Arg Ser
 145 150 155 160
 Ser Gly Ser Ser Arg Val Ile Ala Ser Gly Lys Lys Phe Ile Glu Gly
 165 170 175
 Phe Gln Ser Thr Lys Leu Lys Asp Pro Arg Ala Gln Pro Gly Gln Ser
 180 185 190
 Ser Pro Lys Ile Asp Val Val Ile Ser Glu Ala Ser Ser Ser Asn Asn
 195 200 205
 Thr Leu Asp Pro Gly Thr Cys Thr Val Phe Glu Asp Ser Glu Leu Ala
 210 215 220
 Asp Thr Val Glu Ala Asn Phe Thr Ala Thr Phe Val Pro Ser Ile Arg
 225 230 235 240
 Gln Arg Leu Glu Asn Asp Leu Ser Gly Val Thr Leu Thr Asp Thr Glu
 245 250 255

Val Thr Tyr Leu Met Asp Met Cys Ser Phe Asp Thr Ile Ser Thr Ser
 260 265 270
 Thr Val Asp Thr Lys Leu Ser Pro Phe Cys Asp Leu Phe Thr His Asp
 275 280 285
 Glu Trp Ile Asn Tyr Asp Tyr Leu Gln Ser Leu Arg Lys Tyr Tyr Gly
 290 295 300
 His Gly Ala Gly Asn Pro Leu Gly Pro Thr Gln Gly Val Gly Tyr Ala
 305 310 315 320
 Asn Glu Leu Ile Ala Arg Leu Thr His Ser Pro Val His Asp Asp Thr
 325 330 335
 Ser Ser Asn His Thr Leu Asp Ser Ser Pro Ala Thr Phe Pro Leu Asn
 340 345 350
 Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile
 355 360 365
 Leu Phe Ala Leu Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Thr Thr
 370 375 380
 Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr
 385 390 395 400
 Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala
 405 410 415
 Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
 420 425 430
 Leu His Gly Cys Pro Val Asp Ala Leu Gly Arg Cys Thr Arg Asp Ser
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 Phe Val Arg Gly Leu Ser Phe Ala Arg Ser Gly Gly Asp Trp Ala Glu
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<210> 29

<211> 2665

<212> DNA

<213> *Aspergillus niger*

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<210> 30
 <211> 467
 <212> PRT
 <213> *Aspergillus niger*

<400> 30

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Thr Ser Gly Leu Ala Val Pro Ala Ser Arg Asn Gln Ser Ser Cys Asp
 20 25 30

Thr Val Asp Gln Gly Tyr Gln Cys Phe Ser Glu Thr Ser His Leu Trp
 35 40 45

Gly Gln Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
 50 55 60

Pro Glu Val Pro Ala Gly Cys Arg Val Thr Phe Ala Gln Val Leu Ser
 65 70 75 80

Arg His Gly Ala Arg Tyr Pro Thr Asp Ser Lys Gly Lys Lys Tyr Ser
 85 90 95

Ala Leu Ile Glu Glu Ile Gln Gln Asn Ala Thr Thr Phe Asp Gly Lys
 100 105 110

Tyr Ala Phe Leu Lys Thr Tyr Asn Tyr Ser Leu Gly Ala Asp Asp Leu
 115 120 125

Thr Pro Phe Gly Glu Gln Glu Leu Val Asn Ser Gly Ile Lys Phe Tyr
 130 135 140

Gln Arg Tyr Glu Ser Leu Thr Arg Asn Ile Val Pro Phe Ile Arg Ser
 145 150 155 160

Ser Gly Ser Ser Arg Val Ile Ala Ser Gly Lys Lys Phe Ile Glu Gly
 165 170 175

Phe Gln Ser Thr Lys Leu Lys Asp Pro Arg Ala Gln Pro Gly Gln Ser
 180 185 190

Ser Pro Lys Ile Asp Val Val Ile Ser Glu Ala Ser Ser Ser Asn Asn
 195 200 205

Thr Leu Asp Pro Gly Thr Cys Thr Val Phe Glu Asp Ser Glu Leu Ala
 210 215 220

Asp Thr Val Glu Ala Asn Phe Thr Ala Thr Phe Val Pro Ser Ile Arg			
225	230	235	240
Gln Arg Leu Glu Asn Asp Leu Ser Gly Val Thr Leu Thr Asp Thr Glu			
	245	250	255
Val Thr Tyr Leu Met Asp Met Cys Ser Phe Asp Thr Ile Ser Thr Ser			
	260	265	270
Thr Val Asp Thr Lys Leu Ser Pro Phe Cys Asp Leu Phe Thr His Asp			
	275	280	285
Glu Trp Ile Asn Tyr Asp Tyr Leu Gln Ser Leu Thr Lys Tyr Tyr Gly			
	290	295	300
His Gly Ala Gly Asn Pro Leu Gly Pro Thr Gln Gly Val Gly Tyr Ala			
305	310	315	320
Asn Glu Leu Ile Ala Arg Leu Thr His Ser Pro Val His Asp Asp Thr			
	325	330	335
Ser Ser Asn His Thr Leu Asp Ser Ser Pro Ala Thr Phe Pro Leu Asn			
	340	345	350
Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile			
	355	360	365
Leu Phe Ala Leu Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Thr Thr			
	370	375	380
Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr			
385	390	395	400
Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala			
	405	410	415
Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro			
	420	425	430
Leu His Gly Cys Pro Val Asp Ala Leu Gly Arg Cys Thr Arg Asp Ser			
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Phe Val Arg Gly Leu Ser Phe Ala Arg Ser Gly Gly Asp Trp Ala Glu			
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<210> 31
 <211> 2665
 <212> DNA
 <213> *Aspergillus niger*

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<210> 32

<211> 467

<212> PRT

<213> *Aspergillus niger*

<400> 32

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 20 25 30

Thr Val Asp Gln Gly Tyr Gln Cys Phe Ser Glu Thr Ser His Leu Trp
 35 40 45

Gly Gln Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
 50 55 60

Pro Glu Val Pro Ala Gly Cys Arg Val Thr Phe Ala Gln Val Leu Ser
 65 70 75 80

Arg His Gly Ala Arg Tyr Pro Thr Asp Ser Lys Gly Lys Lys Tyr Ser
 85 90 95

Ala Leu Ile Glu Glu Ile Gln Gln Asn Ala Thr Thr Phe Asp Gly Lys
 100 105 110

Tyr Ala Phe Leu Lys Thr Tyr Asn Tyr Ser Leu Gly Ala Asp Asp Leu
 115 120 125

Thr Pro Phe Gly Glu Gln Glu Leu Val Asn Ser Gly Ile Lys Phe Tyr
 130 135 140

Gln Arg Tyr Glu Ser Leu Thr Arg Asn Ile Val Pro Phe Ile Arg Ser
 145 150 155 160

Ser Gly Ser Ser Arg Val Ile Ala Ser Gly Lys Lys Phe Ile Glu Gly
 165 170 175

Phe Gln Ser Thr Lys Leu Lys Asp Pro Arg Ala Gln Pro Gly Gln Ser
 180 185 190

Ser Pro Lys Ile Asp Val Val Ile Ser Glu Ala Ser Ser Ser Asn Asn
 195 200 205

Thr Leu Asp Pro Gly Thr Cys Thr Val Phe Glu Asp Ser Glu Leu Ala
 210 215 220

Asp Thr Val Glu Ala Asn Phe Thr Ala Thr Phe Val Pro Ser Ile Arg
 225 230 235 240

Gln Arg Leu Glu Asn Asp Leu Ser Gly Val Thr Leu Thr Asp Thr Glu
 245 250 255

Val Thr Tyr Leu Met Asp Met Cys Ser Phe Asp Thr Ile Ser Thr Ser
 260 265 270

Thr Val Asp Thr Lys Leu Ser Pro Phe Cys Asp Leu Phe Thr His Asp
 275 280 285

Glu Trp Ile Asn Tyr Asp Tyr Leu Gln Ser Leu Asp Lys Tyr Tyr Gly
 290 295 300

His Gly Ala Gly Asn Pro Leu Gly Pro Thr Gln Gly Val Gly Tyr Ala
 305 310 315 320

Asn Glu Leu Ile Ala Arg Leu Thr His Ser Pro Val His Asp Asp Thr
 325 330 335

Ser Ser Asn His Thr Leu Asp Ser Ser Pro Ala Thr Phe Pro Leu Asn
 340 345 350

Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile
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Leu Phe Ala Leu Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Thr Thr
 370 375 380

Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr
 385 390 395 400

Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala
 405 410 415

Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
 420 425 430

Leu His Gly Cys Pro Val Asp Ala Leu Gly Arg Cys Thr Arg Asp Ser
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Phe Val Arg Gly Leu Ser Phe Ala Arg Ser Gly Gly Asp Trp Ala Glu
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Cys Phe Ala
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<210> 33
 <211> 2665
 <212> DNA
 <213> *Aspergillus niger*

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<210> 34

<211> 467

<212> PRT

<213> *Aspergillus niger*

<400> 34

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      20              25              30

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Thr Val Asp Gln Gly Tyr Gln Cys Phe Ser Glu Thr Ser His Leu Trp
      35              40              45

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Gly Gln Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
      50              55              60

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Pro Glu Val Pro Ala Gly Cys Arg Val Thr Phe Ala Gln Val Leu Ser
      65              70              75              80

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Arg His Gly Ala Arg Tyr Pro Thr Asp Ser Lys Gly Lys Lys Tyr Ser
      85              90              95

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Ala Leu Ile Glu Glu Ile Gln Gln Asn Ala Thr Thr Phe Asp Gly Lys
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Tyr Ala Phe Leu Lys Thr Tyr Asn Tyr Ser Leu Gly Ala Asp Asp Leu
      115              120              125

```

```

Thr Pro Phe Gly Glu Gln Glu Leu Val Asn Ser Gly Ile Lys Phe Tyr
      130              135              140

```

```

Gln Arg Tyr Glu Ser Leu Thr Arg Asn Ile Val Pro Phe Ile Arg Ser
      145              150              155              160

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Ser Gly Ser Ser Arg Val Ile Ala Ser Gly Lys Lys Phe Ile Glu Gly
 165 170 175

Phe Gln Ser Thr Lys Leu Lys Asp Pro Arg Ala Gln Pro Gly Gln Ser
 180 185 190

Ser Pro Lys Ile Asp Val Val Ile Ser Glu Ala Ser Ser Ser Asn Asn
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Thr Leu Asp Pro Gly Thr Cys Thr Val Phe Glu Asp Ser Glu Leu Ala
 210 215 220

Asp Thr Val Glu Ala Asn Phe Thr Ala Thr Phe Val Pro Ser Ile Arg
 225 230 235 240

Gln Arg Leu Glu Asn Asp Leu Ser Gly Val Thr Leu Thr Asp Thr Glu
 245 250 255

Val Thr Tyr Leu Met Asp Met Cys Ser Phe Asp Thr Ile Ser Thr Ser
 260 265 270

Thr Val Asp Thr Lys Leu Ser Pro Phe Cys Asp Leu Phe Thr His Asp
 275 280 285

Glu Trp Ile Asn Tyr Asp Tyr Leu Gln Ser Leu Lys Glu Tyr Tyr Gly
 290 295 300

His Gly Ala Gly Asn Pro Leu Gly Pro Thr Gln Gly Val Gly Tyr Ala
 305 310 315 320

Asn Glu Leu Ile Ala Arg Leu Thr His Ser Pro Val His Asp Asp Thr
 325 330 335

Ser Ser Asn His Thr Leu Asp Ser Ser Pro Ala Thr Phe Pro Leu Asn
 340 345 350

Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile
 355 360 365

Leu Phe Ala Leu Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Thr Thr
 370 375 380

Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr
 385 390 395 400

Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala
 405 410 415

Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
420 425 430

Leu His Gly Cys Pro Val Asp Ala Leu Gly Arg Cys Thr Arg Asp Ser
435 440 445

Phe Val Arg Gly Leu Ser Phe Ala Arg Ser Gly Gly Asp Trp Ala Glu
450 455 460

Cys Phe Ala
465

<210> 35

<211> 2665

<212> DNA

<213> *Aspergillus niger*

<400> 35

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<210> 36

<211> 467

<212> PRT

<213> *Aspergillus niger*

<400> 36

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Met Gly Val Ser Ala Val Leu Leu Pro Leu Tyr Leu Leu Ser Gly Val
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Thr Ser Gly Leu Ala Val Pro Ala Ser Arg Asn Gln Ser Ser Cys Asp
      20             25             30

```

```

Thr Val Asp Gln Gly Tyr Gln Cys Phe Ser Glu Thr Ser His Leu Trp
      35             40             45

```

```

Gly Gln Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
      50             55             60

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```

Pro Glu Val Pro Ala Gly Cys Arg Val Thr Phe Ala Gln Val Leu Ser
      65             70             75             80

```

```

Arg His Gly Ala Arg Tyr Pro Thr Asp Ser Lys Gly Lys Lys Tyr Ser
      85             90             95

```

```

Ala Leu Ile Glu Glu Ile Gln Gln Asn Ala Thr Thr Phe Asp Gly Lys
      100            105            110

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```

Tyr Ala Phe Leu Lys Thr Tyr Asn Tyr Ser Leu Gly Ala Asp Asp Leu
      115            120            125

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Thr Pro Phe Gly Glu Gln Glu Leu Val Asn Ser Gly Ile Lys Phe Tyr
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Gln Arg Tyr Glu Ser Leu Thr Arg Asn Ile Val Pro Phe Ile Arg Ser
 145 150 155 160

Ser Gly Ser Ser Arg Val Ile Ala Ser Gly Lys Lys Phe Ile Glu Gly
 165 170 175

Phe Gln Ser Thr Lys Leu Lys Asp Pro Arg Ala Gln Pro Gly Gln Ser
 180 185 190

Ser Pro Lys Ile Asp Val Val Ile Ser Glu Ala Ser Ser Ser Asn Asn
 195 200 205

Thr Leu Asp Pro Gly Thr Cys Thr Val Phe Glu Asp Ser Glu Leu Ala
 210 215 220

Asp Thr Val Glu Ala Asn Phe Thr Ala Thr Phe Val Pro Ser Ile Arg
 225 230 235 240

Gln Arg Leu Glu Asn Asp Leu Ser Gly Val Thr Leu Thr Asp Thr Glu
 245 250 255

Val Thr Tyr Leu Met Asp Met Cys Ser Phe Asp Thr Ile Ser Thr Ser
 260 265 270

Thr Val Asp Thr Lys Leu Ser Pro Phe Cys Asp Leu Phe Thr His Asp
 275 280 285

Glu Trp Ile Asn Tyr Asp Tyr Leu Gln Ser Leu Glu Glu Tyr Tyr Gly
 290 295 300

His Gly Ala Gly Asn Pro Leu Gly Pro Thr Gln Gly Val Gly Tyr Ala
 305 310 315 320

Asn Glu Leu Ile Ala Arg Leu Thr His Ser Pro Val His Asp Asp Thr
 325 330 335

Ser Ser Asn His Thr Leu Asp Ser Ser Pro Ala Thr Phe Pro Leu Asn
 340 345 350

Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile
 355 360 365

Leu Phe Ala Leu Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Thr Thr
 370 375 380

Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr
 385 390 395 400

Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala
 405 410 415

Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
 420 425 430

Leu His Gly Cys Pro Val Asp Ala Leu Gly Arg Cys Thr Arg Asp Ser
 435 440 445

Phe Val Arg Gly Leu Ser Phe Ala Arg Ser Gly Gly Asp Trp Ala Glu
 450 455 460

Cys Phe Ala
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<210> 37

<211> 2665

<212> DNA

<213> *Aspergillus niger*

<400> 37

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<210> 38

<211> 467

<212> PRT

<213> *Aspergillus niger*

<400> 38

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Met Gly Val Ser Ala Val Leu Leu Pro Leu Tyr Leu Leu Ser Gly Val
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Thr Ser Gly Leu Ala Val Pro Ala Ser Arg Asn Gln Ser Ser Cys Asp
      20                      25                      30

```

```

Thr Val Asp Gln Gly Tyr Gln Cys Phe Ser Glu Thr Ser His Leu Trp
      35                      40                      45

```

```

Gly Gln Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
      50                      55                      60

```

```

Pro Glu Val Pro Ala Gly Cys Arg Val Thr Phe Ala Gln Val Leu Ser
      65                      70                      75                      80

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```

Arg His Gly Ala Arg Tyr Pro Thr Asp Ser Lys Gly Lys Lys Tyr Ser
      85                      90                      95

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Ala	Leu	Ile	Glu	Glu	Ile	Gln	Gln	Asn	Ala	Thr	Thr	Phe	Asp	Gly	Lys	100	105	110
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Thr	Pro	Phe	Gly	Glu	Gln	Glu	Leu	Val	Asn	Ser	Gly	Ile	Lys	Phe	Tyr	130	135	140
Gln	Arg	Tyr	Glu	Ser	Leu	Thr	Arg	Asn	Ile	Val	Pro	Phe	Ile	Arg	Ser	145	150	155
Ser	Gly	Ser	Ser	Arg	Val	Ile	Ala	Ser	Gly	Lys	Lys	Phe	Ile	Glu	Gly	165	170	175
Phe	Gln	Ser	Thr	Lys	Leu	Lys	Asp	Pro	Arg	Ala	Gln	Pro	Gly	Gln	Ser	180	185	190
Ser	Pro	Lys	Ile	Asp	Val	Val	Ile	Ser	Glu	Ala	Ser	Ser	Ser	Asn	Asn	195	200	205
Thr	Leu	Asp	Pro	Gly	Thr	Cys	Thr	Val	Phe	Glu	Asp	Ser	Glu	Leu	Ala	210	215	220
Asp	Thr	Val	Lys	Ala	Asn	Phe	Thr	Ala	Thr	Phe	Val	Pro	Ser	Ile	Arg	225	230	235
Gln	Arg	Leu	Glu	Asn	Asp	Leu	Ser	Gly	Val	Thr	Leu	Thr	Asp	Thr	Glu	245	250	255
Val	Thr	Tyr	Leu	Met	Asp	Met	Cys	Ser	Phe	Asp	Thr	Ile	Ser	Thr	Ser	260	265	270
Thr	Val	Asp	Thr	Lys	Leu	Ser	Pro	Phe	Cys	Asp	Leu	Phe	Thr	His	Asp	275	280	285
Glu	Trp	Ile	Asn	Tyr	Asp	Tyr	Leu	Gln	Ser	Leu	Asp	Lys	Tyr	Tyr	Gly	290	295	300
His	Gly	Ala	Gly	Asn	Pro	Leu	Gly	Pro	Thr	Gln	Gly	Val	Gly	Tyr	Ala	305	310	315
Asn	Glu	Leu	Ile	Ala	Arg	Leu	Thr	His	Ser	Pro	Val	His	Asp	Asp	Thr	325	330	335
Ser	Ser	Asn	His	Thr	Leu	Asp	Ser	Ser	Pro	Ala	Thr	Phe	Pro	Leu	Asn	340	345	350

Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile
 355 360 365

Leu Phe Ala Leu Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Thr Thr
 370 375 380

Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr
 385 390 395 400

Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala
 405 410 415

Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
 420 425 430

Leu His Gly Cys Pro Val Asp Ala Leu Gly Arg Cys Thr Arg Asp Ser
 435 440 445

Phe Val Arg Gly Leu Ser Phe Ala Arg Ser Gly Gly Asp Trp Ala Glu
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Cys Phe Ala
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<210> 39

<211> 2665

<212> DNA

<213> *Aspergillus niger*

<400> 39

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<210> 40

<211> 467

<212> PRT

<213> *Aspergillus niger*

<400> 40

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Met Gly Val Ser Ala Val Leu Leu Pro Leu Tyr Leu Leu Ser Gly Val
  1                      5                      10                      15

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Thr Ser Gly Leu Ala Val Pro Ala Ser Arg Asn Gln Ser Ser Cys Asp
      20                      25                      30

```

```

Thr Val Asp Gln Gly Tyr Gln Cys Phe Ser Glu Thr Ser His Leu Trp
      35                      40                      45

```

```

Gly Gln Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
      50                      55                      60

```

Pro	Glu	Val	Pro	Ala	Gly	Cys	Arg	Val	Thr	Phe	Ala	Gln	Val	Leu	Ser	65	70	75	80
Arg	His	Gly	Ala	Arg	Tyr	Pro	Thr	Asp	Ser	Lys	Gly	Lys	Lys	Tyr	Ser	85	90	95	
Ala	Leu	Ile	Glu	Glu	Ile	Gln	Gln	Asn	Ala	Thr	Thr	Phe	Asp	Gly	Lys	100	105	110	
Tyr	Ala	Phe	Leu	Lys	Thr	Tyr	Asn	Tyr	Ser	Leu	Gly	Ala	Asp	Asp	Leu	115	120	125	
Thr	Pro	Phe	Gly	Glu	Gln	Glu	Leu	Val	Asn	Ser	Gly	Ile	Lys	Phe	Tyr	130	135	140	
Gln	Arg	Tyr	Glu	Ser	Leu	Thr	Arg	Asn	Ile	Val	Pro	Phe	Ile	Arg	Ser	145	150	155	160
Ser	Gly	Ser	Ser	Arg	Val	Ile	Ala	Ser	Gly	Lys	Lys	Phe	Ile	Glu	Gly	165	170	175	
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Ser	Pro	Lys	Ile	Asp	Val	Val	Ile	Ser	Glu	Ala	Ser	Ser	Ser	Asn	Asn	195	200	205	
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Thr	Val	Asp	Thr	Lys	Leu	Ser	Pro	Phe	Cys	Asp	Leu	Phe	Thr	His	Asp	275	280	285	
Glu	Trp	Ile	Asn	Tyr	Asp	Tyr	Leu	Gln	Ser	Leu	Arg	Lys	Tyr	Tyr	Gly	290	295	300	
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 Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala
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<210> 41

<211> 2665

<212> DNA

<213> *Aspergillus niger*

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<210> 42

<211> 467

<212> PRT

<213> *Aspergillus niger*

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<213> *Aspergillus niger*

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2665

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<211> 467

<212> PRT

<213> *Aspergillus niger*

<400> 44

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<213> Aspergillus niger

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Pro	Glu	Val	Pro	Ala	Gly	Cys	Arg	Val	Thr	Phe	Ala	Gln	Val	Leu	Ser
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 245 250 255
 Val Thr Tyr Leu Met Asp Met Cys Ser Phe Asp Thr Ile Ser Thr Ser
 260 265 270
 Thr Val Asp Thr Lys Leu Ser Pro Phe Cys Asp Leu Phe Thr His Asp
 275 280 285
 Glu Trp Ile Asn Tyr Asp Tyr Leu Gln Ser Leu Thr Glu Tyr Tyr Gly
 290 295 300
 His Gly Ala Gly Asn Pro Leu Gly Pro Thr Gln Gly Val Gly Tyr Ala
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 Asn Glu Leu Ile Ala Arg Leu Thr His Ser Pro Val His Asp Asp Thr
 325 330 335
 Ser Ser Asn His Thr Leu Asp Ser Ser Pro Ala Thr Phe Pro Leu Asn
 340 345 350
 Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile
 355 360 365
 Leu Phe Ala Leu Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Thr Thr
 370 375 380
 Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr
 385 390 395 400
 Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala
 405 410 415
 Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
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<210> 47
 <211> 2665
 <212> DNA
 <213> *Aspergillus niger*

<400> 47

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<211> 467

<212> PRT

<213> *Aspergillus niger*

<400> 48

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 35 40 45

Gly Gln Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
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Pro Glu Val Pro Ala Gly Cys Arg Val Thr Phe Ala Gln Val Leu Ser
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Arg His Gly Ala Arg Tyr Pro Thr Asp Ser Lys Gly Lys Lys Tyr Ser
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Ala Leu Ile Glu Glu Ile Gln Gln Asn Ala Thr Thr Phe Asp Gly Lys
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Tyr Ala Phe Leu Lys Thr Tyr Asn Tyr Ser Leu Gly Ala Asp Asp Leu
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Thr Pro Phe Gly Glu Gln Glu Leu Val Asn Ser Gly Ile Lys Phe Tyr
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Gln Arg Tyr Glu Ser Leu Thr Arg Asn Ile Val Pro Phe Ile Arg Ser
 145 150 155 160

Ser Gly Ser Ser Arg Val Ile Ala Ser Gly Lys Lys Phe Ile Glu Gly
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Phe Gln Ser Thr Lys Leu Lys Asp Pro Arg Ala Gln Pro Gly Gln Ser
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Ser Pro Lys Ile Asp Val Val Ile Ser Glu Ala Ser Ser Ser Asn Asn
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Thr Leu Asp Pro Gly Thr Cys Thr Val Phe Glu Asp Ser Glu Leu Ala
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Asp Thr Val Lys Ala Asn Phe Thr Ala Thr Phe Val Pro Ser Ile Arg
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Gln Arg Leu Glu Asn Asp Leu Ser Gly Val Thr Leu Thr Asp Thr Glu
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Val Thr Tyr Leu Met Asp Met Cys Ser Phe Asp Thr Ile Ser Thr Ser
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Thr Val Asp Thr Lys Leu Ser Pro Phe Cys Asp Leu Phe Thr His Asp
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Glu Trp Ile Asn Tyr Asp Tyr Leu Gln Ser Leu Asp Glu Tyr Tyr Gly
 290 295 300

His Gly Ala Gly Asn Pro Leu Gly Pro Thr Gln Gly Val Gly Tyr Ala
 305 310 315 320

Asn Glu Leu Ile Ala Arg Leu Thr His Ser Pro Val His Asp Asp Thr
 325 330 335

Ser Ser Asn His Thr Leu Asp Ser Ser Pro Ala Thr Phe Pro Leu Asn
 340 345 350

Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile
 355 360 365

Leu Phe Ala Leu Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Thr Thr
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Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr
 385 390 395 400

Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala
 405 410 415

Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
 420 425 430

Leu His Gly Cys Pro Val Asp Ala Leu Gly Arg Cys Thr Arg Asp Ser
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Phe Val Arg Gly Leu Ser Phe Ala Arg Ser Gly Gly Asp Trp Ala Glu
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Cys Phe Ala
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<210> 49

<211> 2665

<212> DNA

<213> *Aspergillus niger*

<400> 49

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<210> 50

<211> 467

<212> PRT

<213> *Aspergillus niger*

<400> 50

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Thr Val Asp Gln Gly Tyr Gln Cys Phe Ser Glu Thr Ser His Leu Trp
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Gly Gln Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
      50              55              60

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Pro Glu Val Pro Ala Gly Cys Arg Val Thr Phe Ala Gln Val Leu Ser
      65              70              75              80

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Arg His Gly Ala Arg Tyr Pro Thr Asp Ser Lys Gly Lys Glu Tyr Ser
      85              90              95

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Ala Leu Ile Glu Glu Ile Gln Gln Asn Ala Thr Thr Phe Asp Gly Lys
      100              105              110

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Tyr Ala Phe Leu Lys Thr Tyr Asn Tyr Ser Leu Gly Ala Asp Asp Leu
      115              120              125

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Thr Pro Phe Gly Glu Gln Glu Leu Val Asn Ser Gly Ile Lys Phe Tyr
      130              135              140

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Gln Arg Tyr Glu Ser Leu Thr Arg Asn Ile Val Pro Phe Ile Arg Ser
      145              150              155              160

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 210 215 220
 Asp Thr Val Glu Ala Asn Phe Thr Ala Thr Phe Val Pro Ser Ile Arg
 225 230 235 240
 Gln Arg Leu Glu Asn Asp Leu Ser Gly Val Thr Leu Thr Asp Thr Glu
 245 250 255
 Val Thr Tyr Leu Met Asp Met Cys Ser Phe Asp Thr Ile Ser Thr Ser
 260 265 270
 Thr Val Asp Thr Lys Leu Ser Pro Phe Cys Asp Leu Phe Thr His Asp
 275 280 285
 Glu Trp Ile Asn Tyr Asp Tyr Leu Gln Ser Leu Glu Glu Tyr Tyr Gly
 290 295 300
 His Gly Ala Gly Asn Pro Leu Gly Pro Thr Gln Gly Val Gly Tyr Ala
 305 310 315 320
 Asn Glu Leu Ile Ala Arg Leu Thr His Ser Pro Val His Asp Asp Thr
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 Ser Ser Asn His Thr Leu Asp Ser Ser Pro Ala Thr Phe Pro Leu Asn
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 Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile
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 370 375 380
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 Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala
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Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
420 425 430

Leu His Gly Cys Pro Val Asp Ala Leu Gly Arg Cys Thr Arg Asp Ser
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Phe Val Arg Gly Leu Ser Phe Ala Arg Ser Gly Gly Asp Trp Ala Glu
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Cys Phe Ala
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<210> 51

<211> 2665

<212> DNA

<213> *Aspergillus niger*

<400> 51

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<210> 52

<211> 467

<212> PRT

<213> *Aspergillus niger*

<400> 52

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    20             25             30

Thr Val Asp Gln Gly Tyr Gln Cys Phe Ser Glu Thr Ser His Leu Trp
    35             40             45

Gly Gln Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
    50             55             60

Pro Glu Val Pro Ala Gly Cys Arg Val Thr Phe Ala Gln Val Leu Ser
    65             70             75             80

Arg His Gly Ala Arg Tyr Pro Thr Asp Ser Lys Gly Lys Glu Tyr Ser
    85             90             95

Ala Leu Ile Glu Glu Ile Gln Gln Asn Ala Thr Thr Phe Asp Gly Lys
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Tyr Ala Phe Leu Lys Thr Tyr Asn Tyr Ser Leu Gly Ala Asp Asp Leu
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Asp	Thr	Val	Lys	Ala	Asn	Phe	Thr	Ala	Thr	Phe	Val	Pro	Ser	Ile	Arg	225	230	235	240
Gln	Arg	Leu	Glu	Asn	Asp	Leu	Ser	Gly	Val	Thr	Leu	Thr	Asp	Thr	Glu	245	250	255	
Val	Thr	Tyr	Leu	Met	Asp	Met	Cys	Ser	Phe	Asp	Thr	Ile	Ser	Thr	Ser	260	265	270	
Thr	Val	Asp	Thr	Lys	Leu	Ser	Pro	Phe	Cys	Asp	Leu	Phe	Thr	His	Asp	275	280	285	
Glu	Trp	Ile	Asn	Tyr	Asp	Tyr	Leu	Gln	Ser	Leu	Lys	Glu	Tyr	Tyr	Gly	290	295	300	
His	Gly	Ala	Gly	Asn	Pro	Leu	Gly	Pro	Thr	Gln	Gly	Val	Gly	Tyr	Ala	305	310	315	320
Asn	Glu	Leu	Ile	Ala	Arg	Leu	Thr	His	Ser	Pro	Val	His	Asp	Asp	Thr	325	330	335	
Ser	Ser	Asn	His	Thr	Leu	Asp	Ser	Ser	Pro	Ala	Thr	Phe	Pro	Leu	Asn	340	345	350	
Ser	Thr	Leu	Tyr	Ala	Asp	Phe	Ser	His	Asp	Asn	Gly	Ile	Ile	Ser	Ile	355	360	365	
Leu	Phe	Ala	Leu	Gly	Leu	Tyr	Asn	Gly	Thr	Lys	Pro	Leu	Ser	Thr	Thr	370	375	380	

Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr
 385 390 395 400

Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala
 405 410 415

Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
 420 425 430

Leu His Gly Cys Pro Val Asp Ala Leu Gly Arg Cys Thr Arg Asp Ser
 435 440 445

Phe Val Arg Gly Leu Ser Phe Ala Arg Ser Gly Gly Asp Trp Ala Glu
 450 455 460

Cys Phe Ala
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<210> 53
 <211> 2665
 <212> DNA
 <213> *Aspergillus niger*

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 attcatgtag atcttttgcta agagaaatga tggcggccca gggcatccag gcaccttttc 300
 caacggggaa cttccgccgt ccacgtgctc tgattcagcc aatcaagacg tcccacggca 360
 atgctggatc aacgatcaac ttgaatgcaa taaatgaaga tggaaactaac accatctgct 420
 gcctttctct cgagaaaagct cctccacttc tcccactaga tatctccgtc cccgtcgact 480
 tcccgtccta ttcggcctcg tccgctgaag atccatccca ccattgcacg tgggccacct 540
 ttgtgagctt ctaacctgaa ctggtagagt atcacacacc atgccaaggt gggatgaagg 600
 ggttatatag gaccgtccgg tccggcgcca tggcgcgtagc tgccactcgc tgctgtgcaa 660
 gaaattactt ctcataggca tcatgggcgt ctctgctgtt ctacttcctt tgtatctcct 720
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 caccaagctg aaggatcctc gtgccagcc cgccaatcg tcgccaaga tcgacgtggt 1380

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gtagaagaag cagacgacct ctccaccaat ctcttcgggc tcttatcccc atacgtata 2640
caaaaccccc accccgttag catgc 2665

```

<210> 54

<211> 467

<212> PRT

<213> *Aspergillus niger*

<400> 54

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Met Gly Val Ser Ala Val Leu Leu Pro Leu Tyr Leu Leu Ser Gly Val
  1             5             10            15

```

```

Thr Ser Gly Leu Ala Val Pro Ala Ser Arg Asn Gln Ser Ser Cys Asp
      20             25            30

```

```

Thr Val Asp Gln Gly Tyr Gln Cys Phe Ser Glu Thr Ser His Leu Trp
      35             40            45

```

```

Gly Gln Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
      50             55            60

```

```

Pro Glu Val Pro Ala Gly Cys Arg Val Thr Phe Ala Gln Val Leu Ser
      65             70            75            80

```

```

Arg His Gly Ala Arg Tyr Pro Thr Asp Ser Ala Gly Lys Lys Tyr Ser
      85             90            95

```

Ala	Leu	Ile	Glu	Glu	Ile	Gln	Gln	Asn	Ala	Thr	Thr	Phe	Asp	Gly	Lys	100	105	110
Tyr	Ala	Phe	Leu	Lys	Thr	Tyr	Asn	Tyr	Ser	Leu	Gly	Ala	Asp	Asp	Leu	115	120	125
Thr	Pro	Phe	Gly	Glu	Gln	Glu	Leu	Val	Asn	Ser	Gly	Ile	Lys	Phe	Tyr	130	135	140
Gln	Arg	Tyr	Glu	Ser	Leu	Thr	Arg	Asn	Ile	Val	Pro	Phe	Ile	Arg	Ser	145	150	155
Ser	Gly	Ser	Ser	Arg	Val	Ile	Ala	Ser	Gly	Lys	Lys	Phe	Ile	Glu	Gly	165	170	175
Phe	Gln	Ser	Thr	Lys	Leu	Lys	Asp	Pro	Arg	Ala	Gln	Pro	Gly	Gln	Ser	180	185	190
Ser	Pro	Lys	Ile	Asp	Val	Val	Ile	Ser	Glu	Ala	Ser	Ser	Ser	Asn	Asn	195	200	205
Thr	Leu	Asp	Pro	Gly	Thr	Cys	Thr	Val	Phe	Glu	Asp	Ser	Glu	Leu	Ala	210	215	220
Asp	Thr	Val	Gln	Ala	Asn	Phe	Thr	Ala	Thr	Phe	Val	Pro	Ser	Ile	Arg	225	230	235
Gln	Arg	Leu	Glu	Asn	Asp	Leu	Ser	Gly	Val	Thr	Leu	Thr	Asp	Thr	Glu	245	250	255
Val	Thr	Tyr	Leu	Met	Asp	Met	Cys	Ser	Phe	Asp	Thr	Ile	Ser	Thr	Ser	260	265	270
Thr	Val	Asp	Thr	Lys	Leu	Ser	Pro	Phe	Cys	Asp	Leu	Phe	Thr	His	Asp	275	280	285
Glu	Trp	Ile	Asn	Tyr	Asp	Tyr	Leu	Gln	Ser	Leu	Glu	Lys	Tyr	Tyr	Gly	290	295	300
His	Gly	Ala	Gly	Asn	Pro	Leu	Gly	Pro	Thr	Gln	Gly	Val	Gly	Tyr	Ala	305	310	315
Asn	Glu	Leu	Ile	Ala	Arg	Leu	Thr	His	Ser	Pro	Val	His	Asp	Asp	Thr	325	330	335
Ser	Ser	Asn	His	Thr	Leu	Asp	Ser	Ser	Pro	Ala	Thr	Phe	Pro	Leu	Asn	340	345	350

Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile
 355 360 365

Leu Phe Ala Leu Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Thr Thr
 370 375 380

Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr
 385 390 395 400

Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala
 405 410 415

Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
 420 425 430

Leu His Gly Cys Pro Val Asp Ala Leu Gly Arg Cys Thr Arg Asp Ser
 435 440 445

Phe Val Arg Gly Leu Ser Phe Ala Arg Ser Gly Gly Asp Trp Ala Glu
 450 455 460

Cys Phe Ala
 465

<210> 55

<211> 2665

<212> DNA

<213> *Aspergillus niger*

<400> 55

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caaaaccccc accccgttag catgc 2665

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<210> 56

<211> 467

<212> PRT

<213> *Aspergillus niger*

<400> 56

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Met Gly Val Ser Ala Val Leu Leu Pro Leu Tyr Leu Leu Ser Gly Val
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Thr Ser Gly Leu Ala Val Pro Ala Ser Arg Asn Gln Ser Ser Cys Asp
      20                      25                     30

```

```

Thr Val Asp Gln Gly Tyr Gln Cys Phe Ser Glu Thr Ser His Leu Trp
    35                      40                     45

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```

Gly Gln Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
    50                      55                     60

```

Pro	Glu	Val	Pro	Ala	Gly	Cys	Arg	Val	Thr	Phe	Ala	Gln	Val	Leu	Ser	65	70	75	80
Arg	His	Gly	Ala	Arg	Tyr	Pro	Thr	Asp	Ser	Lys	Gly	Lys	Ala	Tyr	Ser	85	90	95	
Ala	Leu	Ile	Glu	Glu	Ile	Gln	Gln	Asn	Ala	Thr	Thr	Phe	Asp	Gly	Lys	100	105	110	
Tyr	Ala	Phe	Leu	Lys	Thr	Tyr	Asn	Tyr	Ser	Leu	Gly	Ala	Asp	Asp	Leu	115	120	125	
Thr	Pro	Phe	Gly	Glu	Gln	Glu	Leu	Val	Asn	Ser	Gly	Ile	Lys	Phe	Tyr	130	135	140	
Gln	Arg	Tyr	Glu	Ser	Leu	Thr	Arg	Asn	Ile	Val	Pro	Phe	Ile	Arg	Ser	145	150	155	160
Ser	Gly	Ser	Ser	Arg	Val	Ile	Ala	Ser	Gly	Lys	Lys	Phe	Ile	Glu	Gly	165	170	175	
Phe	Gln	Ser	Thr	Lys	Leu	Lys	Asp	Pro	Arg	Ala	Gln	Pro	Gly	Gln	Ser	180	185	190	
Ser	Pro	Lys	Ile	Asp	Val	Val	Ile	Ser	Glu	Ala	Ser	Ser	Ser	Asn	Asn	195	200	205	
Thr	Leu	Asp	Pro	Gly	Thr	Cys	Thr	Val	Phe	Glu	Asp	Ser	Glu	Leu	Ala	210	215	220	
Asp	Thr	Val	Ala	Ala	Asn	Phe	Thr	Ala	Thr	Phe	Val	Pro	Ser	Ile	Arg	225	230	235	240
Gln	Arg	Leu	Glu	Asn	Asp	Leu	Ser	Gly	Val	Thr	Leu	Thr	Asp	Thr	Glu	245	250	255	
Val	Thr	Tyr	Leu	Met	Ala	Met	Cys	Ser	Phe	Asp	Thr	Ile	Ser	Thr	Ser	260	265	270	
Thr	Val	Asp	Thr	Lys	Leu	Ser	Pro	Phe	Cys	Asp	Leu	Phe	Thr	His	Asp	275	280	285	
Glu	Trp	Ile	Asn	Tyr	Asp	Tyr	Leu	Gln	Ser	Leu	Asp	Lys	Tyr	Tyr	Gly	290	295	300	
His	Gly	Ala	Gly	Asn	Pro	Leu	Gly	Pro	Thr	Gln	Gly	Val	Gly	Tyr	Ala	305	310	315	320

Asn Glu Leu Ile Ala Arg Leu Thr His Ser Pro Val His Asp Asp Thr
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 Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile
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 Leu Phe Ala Leu Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Thr Thr
 370 375 380
 Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr
 385 390 395 400
 Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala
 405 410 415
 Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
 420 425 430
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 435 440 445
 Phe Val Arg Gly Leu Ser Phe Ala Arg Ser Gly Gly Asp Trp Ala Glu
 450 455 460
 Cys Phe Ala
 465

<210> 57
 <211> 21
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence:
 Oligonucleotide for generating site-specific
 insertions

<400> 57
 ctttgggggtc tatacgacc g

21

<210> 58
 <211> 21
 <212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:

Oligonucleotide for generating site-specific
insertions

<400> 58

ctttggggtc catacgcacc g

21

<210> 59

<211> 27

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:

Oligonucleotide for generating site-specific
insertions

<400> 59

cacgacaaca gcctggtttc catcttc

27

<210> 60

<211> 25

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 60

gcgaattctc caagtcctgc gatac

25

<210> 61

<211> 23

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 61

acatctagac taaagcactc tcc

23

<210> 62
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:
Oligonucleotide for generating site-specific
insertions

<400> 62
ctccagtcct tggaaaagta ttacg

25

<210> 63
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:
Oligonucleotide for generating site-specific
insertions

<400> 63
ctccagtcct tggataagta ttacggc

27

<210> 64
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:
Oligonucleotide for generating site-specific
insertions

<400> 64
ctccagtcct tgagaaaagta ttacggc

27

<210> 65
<211> 27
<212> DNA
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:

Oligonucleotide for generating site-specific
insertions

<400> 65

ctccagtcct tgacaaagta ttacggc

27

<210> 66

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 66

cggaattcct ggcagtcctcc g

21

<210> 67

<211> 24

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 67

gctctagact aagcaaaaca ctcc

24

<210> 68

<211> 2665

<212> DNA

<213> *Aspergillus niger*

<400> 68

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<211> 467

<212> PRT

<213> *Aspergillus niger*

<400> 69

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Thr Ser Gly Leu Ala Val Pro Ala Ser Arg Asn Gln Ser Ser Cys Asp

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Thr Val Asp Gln Gly Tyr Gln Cys Phe Ser Glu Thr Ser His Leu Trp		
35	40	45
Gly Gln Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser		
50	55	60
Pro Glu Val Pro Ala Gly Cys Arg Val Thr Phe Ala Gln Val Leu Ser		
65	70	75 80
Arg His Gly Ala Arg Tyr Pro Thr Asp Ser Lys Gly Lys Lys Tyr Ser		
85	90	95
Ala Leu Ile Glu Glu Ile Gln Gln Asn Ala Thr Thr Phe Asp Gly Lys		
100	105	110
Tyr Ala Phe Leu Lys Thr Tyr Asn Tyr Ser Leu Gly Ala Asp Asp Leu		
115	120	125
Thr Pro Phe Gly Glu Gln Glu Leu Val Asn Ser Gly Ile Lys Phe Tyr		
130	135	140
Gln Arg Tyr Glu Ser Leu Thr Arg Asn Ile Val Pro Phe Ile Arg Ser		
145	150	155 160
Ser Gly Ser Ser Arg Val Ile Ala Ser Gly Lys Lys Phe Ile Glu Gly		
165	170	175
Phe Gln Ser Thr Lys Leu Lys Asp Pro Arg Ala Gln Pro Gly Gln Ser		
180	185	190
Ser Pro Lys Ile Asp Val Val Ile Ser Glu Ala Ser Ser Ser Asn Asn		
195	200	205
Thr Leu Asp Pro Gly Thr Cys Thr Val Phe Glu Asp Ser Glu Leu Ala		
210	215	220
Asp Thr Val Lys Ala Asn Phe Thr Ala Thr Phe Val Pro Ser Ile Arg		
225	230	235 240
Gln Arg Leu Glu Asn Asp Leu Ser Gly Val Thr Leu Thr Asp Thr Glu		
245	250	255
Val Thr Tyr Leu Met Asp Met Cys Ser Phe Asp Thr Ile Ser Thr Ser		
260	265	270
Thr Val Asp Thr Lys Leu Ser Pro Phe Cys Asp Leu Phe Thr His Asp		

275		280		285
Glu Trp Ile Asn Tyr Asp Tyr Leu Gln Ser Leu Thr Lys Tyr Tyr Gly				
290		295		300
His Gly Ala Gly Asn Pro Leu Gly Pro Thr Gln Gly Val Gly Tyr Ala				
305		310		315
				320
Asn Glu Leu Ile Ala Arg Leu Thr His Ser Pro Val His Asp Asp Thr				
	325		330	335
Ser Ser Asn His Thr Leu Asp Ser Ser Pro Ala Thr Phe Pro Leu Asn				
	340		345	350
Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile				
	355		360	365
Leu Phe Ala Leu Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Thr Thr				
	370		375	380
Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr				
385		390		395
				400
Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala				
	405		410	415
Glu Gln Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro				
	420		425	430
Leu His Gly Cys Pro Val Asp Ala Leu Gly Arg Cys Thr Arg Asp Ser				
	435		440	445
Phe Val Arg Gly Leu Ser Phe Ala Arg Ser Gly Gly Asp Trp Ala Glu				
	450		455	460
Cys Phe Ala				
465				